Math 9 5.1 Modelling Polynomials Lesson 1

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4. Expressions a, c, d, and f are polynomials because they contain terms whose variables have whole-number exponents only. The terms in the polynomial are of degree 1, 2, or a constant (degree 0).

Expression b is not a polynomial because it contains the square root of a variable.
Expression e is not a polynomial because it contains a variable in the denominator.

5. Count the number of terms of different degrees in each polynomial.

a) Trinomial; it has three terms of different degrees.

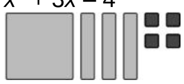
b) Binomial; it has two terms of different degrees.

c) Monomial: it has only one term of degree 1.

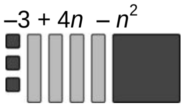
d) Monomial: it has only one term of degree 0.

8. Model each polynomial and compare.

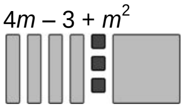
a) $x^2 + 3x - 4$



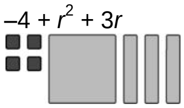
b) $-3 + 4n - n^2$



c) $4m - 3 + m^2$

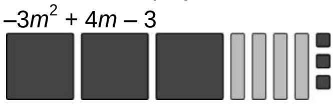


d) $-4 + r^2 + 3r$

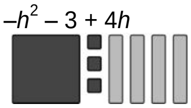


This matches polynomial a.

e) $-3m^2 + 4m - 3$



f) $-h^2 - 3 + 4h$



This matches polynomial b.

The matching polynomials are a and d; and b and f.

9. **a)** Coefficients 5, –6, variable x, degree 2, constant term 2

b) Coefficient 7, variable b, degree 1, constant term –8

c) Coefficient 12, variable c, degree 2, constant term 2

d) Coefficient 12, variable m, degree 1, no constant term

e) No coefficients, no variable, degree 0, constant term 18

f) Coefficients 5, –8, variable x, degree 2, constant term 3

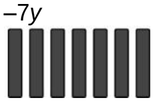
10. Both students are correct. $4a$ is a polynomial because its term has a variable with a whole-number exponent. It is also a monomial because it is a polynomial with only one term.

11. a) $4x - 3$

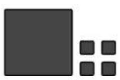
b) $-3n - 1$

c) $2m^2 + m + 2$

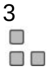
d) $-7y$



e) $-d^2 - 4$



f) 3



12. a) $r^2 - r + 3$ is represented with one r^2-tile, one $-r$-tile, and three 1-tiles. This matches Model B.

b) $-t^2 - 3$ is represented with one t^2-tile and three –3-tiles. This matches Model D.

c) $-2v$ is represented with two $-v$-tiles. This matches Model E.

d) $2w + 2$ is represented with two w-tiles and two 1-tiles. This matches Model A.

e) $2s^2 - 2s + 1$ is represented with two s^2-tiles, two $-s$-tiles, and one 1-tile. This matches Model C.

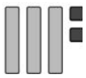
13. Use a table.

Part	Description of Tiles	Polynomial	Description of Polynomial
a	sixteen –1-tiles	–16	monomial, since there is only one term
b	one x-tile and eight –1-tiles	$x - 8$	binomial, since there are two terms of different degrees
c	four x-tiles	$4x$	monomial, since there is only one term
d	two x^2-tiles, eight $-x$-tiles, and three 1-tiles	$2x^2 - 8x + 3$	trinomial, since there are three terms of different degrees
e	five 1-tiles and five $-x$-tiles	$5 - 5x$	binomial, since there are two terms of different degrees
f	five x^2-tiles	$5x^2$	monomial, since there is only one term

g	two $-x^2$-tiles, two x-tiles, and three -1-tiles	$-2x^2 + 2x - 3$	trinomial, since there are three terms of different degrees
h	three $-x^2$-tiles and eight 1-tiles	$-3x^2 + 8$	binomial, since there are two terms of different degrees

14. Answers may vary; for example:

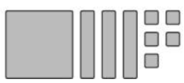
a) $3x - 2$



b) 5

c) $-2x^2$

d) $x^2 + 3x + 5$



15. Use a table.

Model	Description of Tiles	Polynomial
a	two x^2-tiles, three x-tiles, four 1-tiles	$2x^2 + 3x - 4$
b	two $-x^2$-tiles, two x-tiles, four 1-tiles	$-2x^2 + 2x + 4$
c	three x^2-tiles, two $-x$-tiles, four 1-tiles	$3x^2 - 2x + 4$
d	two $-x^2$-tiles, two x-tiles, four 1-tiles	$-2x^2 + 2x + 4$
e	three x^2-tiles, two $-x$-tiles, four 1-tiles	$3x^2 - 2x + 4$
f	two x^2-tiles, three x-tiles, four 1-tiles	$2x^2 + 3x - 4$
g	two $-x^2$-tiles, five x-tiles, two -1-tiles	$-2x^2 + 5x - 2$
h	two $-x^2$-tiles, two x-tiles, four 1-tiles	$-2x^2 + 2x + 4$
i	two $-x^2$-tiles, five x-tiles, two -1-tiles	$-2x^2 + 5x - 2$

Look for matching results.
Models a and f are equivalent. They represent the same polynomial, $2x^2 + 3x - 4$.
Models b, d, and h are equivalent. They represent the same polynomial, $-2x^2 + 2x + 4$.
Models c and e are equivalent. They represent the same polynomial, $3x^2 - 2x + 4$.
Models g and i are equivalent. They represent the same polynomial, $-2x^2 + 5x - 2$.

17. An expression that contains the square root of a variable is not a polynomial.
So, for example, $2\sqrt{x}$ is not a polynomial

20. a) i) Substitute $s = 25$ in $0.4s + 0.02s^2$.

$$0.4(25) + 0.02(25)^2 = 10 + 12.5$$
$$= 22.5$$

The stopping distance of the car is 22.5 m.

ii) Substitute $s = 50$ in $0.4s + 0.02s^2$.

$$0.4(50) + 0.02(50)^2 = 20 + 50$$
$$= 70$$

The stopping distance of the car is 70 m.

iii) Substitute $s = 100$ in $0.4s + 0.02s^2$.

$$0.4(100) + 0.02(100)^2 = 40 + 200$$
$$= 240$$

The stopping distance of the car is 240 m.

b) No, doubling the speed more than doubles the stopping distance. From part a, when the speed is 25 km/h, the stopping distance is 22.5 m, and when the speed is 50 km/h, the stopping distance is 70 m; this is a stopping distance that is 3 times as far. The relationship between speed and stopping distance is not a linear relationship.